Fertilisation strategies for sown organic pasture in the Mediterranean mountains of north-east Portugal

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Introduction The leptosols are dominant soils in the North-east of Portugal , and are occupied mainly with forest , shrubs , cereal and fallow . The restricted and dispersed areas of pasture and fodder crops limit the sustainability of bovine and ovine meat production in organic farming . To achieve this goal in future , the conversion of some of these areas to long-term legume-rich pastures is essential . This experiment was developed to study the viability of these kinds of crops in organic farming systems on these soils .

Materials and methods The experiment has been carried out since autumn 2003 near Bragan a (NE Portugal-41°50′ N , 6°35′W and 860 m asl) in a leptosol with 24 g kg^{-1} organic matter (OM) content , 4 .5 pH(H_2O) , 42 mg kg^{-1} P_2O_5 and 81 mg kg^{-1} K_2O . It comprised the comparison of six fertiliser treatments (F) within two types of pasture (PA) , spontaneous vegetation (SV) and sown pasture (SP) . The fertiliser treatments included different combinations of bovine farmyard manure [(M)-30 t ha^{-1}] , lime [(Ca) 1 .5 t ha^{-1} of lime] , phosphorous [(P) 100 kg ha^{-1} of P_2O_5] , boron [(B) 1 kg ha^{-1}] and the control with no fertiliser (C) . The treatments were : (i) C ; (ii) Ca ; (iii) M ; (iv) Ca+P ; (v) Ca+P+Bo ; (vi) M+Ca+P+Bo . The SP seed rate was 18 kg ha^{-1} in the following proportion of functional groups : 9 annual legumes (50 %) ; 2 perennial legumes (5 %) ; 4 grasses (41 %) ; and chicory (4 %) . It was conducted as a two factor nested design , fertilisation treatments within pasture type , with three random replicates (exclosure cages of 1 m^2) per subplot . The vegetation was subjected to the usual grazing in the farm , and the dry matter (DM) yield samples were obtained each year at the end of spring and autumn , inside the exclosure cages on a 0 .5×0 .5 m quadrat . The data for DM yield excluded a reseeding fallow period from autumn 2005 to spring 2006 and seasonal yields (SY) were analysed as repeated measures .

Results and discussion There were significant effects for the F(PA) x SY interaction ($p<0.0001$) on DM yields , for the effect of F(PA) on DM yields , on spring and autumn DM yield differences and on individual DM yields ($p<0.01$) . Treatment means for each season and year (Fig 1) showed the following results : a) treatments with manure were always the highest yielding group ; b) the SV control treatment yielded significantly less than the four manure treatments in spring 2004 and 2007 , less than the SP M+Ca+P+Bo treatment in spring 2005 , less than the SP M and SV M in autumn 2004 and less than the SP M+Ca+P+Bo and SV M+Ca+P+Bo treatments in autumn 2006 ; and c) only the SP Ca and SP Ca+P treatments had similar yields to the manure treatments in spring 2007 . The high values of legume proportion in these last two treatments in spring 2007 (54 and 61 % DM respectively) may explain the importance of natural reseeding of annual legumes in these treatments . Rinehart (2006) advises manure use in pasture establishment and Jagtap and Abamu (2003) also verified yield improvement of maize under cattle manure application in the absence of N fertiliser .

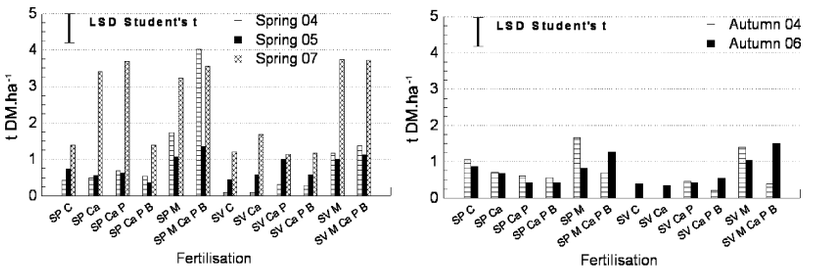

Figure 1 *Dry matter yields in spring and autumn for the* 12 *fertiliser and pasture type treatments .*

Conclusions Manure demonstrated itself to be the most valuable fertilisation strategy for pasture yield in these low fertility soils and climate conditions , Liming may boost the reseeding of annual legumes and have also a significant effect on dry matter production ? in the medium term .

References

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